

In the Claims

1-30 (Canceled)

31. (New) A method for repair of damaged, injured, diseased or aged articular cartilage and cartilage lesions, said method comprising steps:

a) preparing a porous support matrix containing a plurality of pores having a pore size from about 50 to about 500 μm , wherein said matrix is prepared as a porous sponge, porous scaffold, porous honeycomb or porous honeycomb-like lattice;

b) seeding said support matrix with chondrocytes isolated from a donor and suspended in a collagenous solution or collagenous gel;

c) submitting a construct comprising the support matrix seeded with chondrocytes to a constant or cyclic hydrostatic pressure for from about one hour to about 30 days, followed by a resting period wherein said construct is submitted to an atmospheric pressure for about one day to about 60 days,

wherein said hydrostatic pressure is from about 0.01 MPa to about 10 MPa above atmospheric pressure and is applied at a frequency of from about 0.01 to about 2.0 Hz;

d) pre-treating a cartilage lesion by depositing a layer of a biologically acceptable bottom sealant into said lesion before implanting said construct therein;

e) implanting said construct into said pre-treated lesion of step d); and

f) depositing a layer of a biologically acceptable top sealant over said construct implanted into said lesion.

32. (New) The method of claim 31 wherein said top and said bottom sealants are the same or different.

33. (New) The method of claim 32 wherein said top or bottom sealant is selected from the group consisting of gelatin; a copolymer of polyethylene glycol and poly-lactide; a copolymer of

polyethylene glycol and poly-glycolide; periodate-oxidized gelatin; polyethylene glycol diacrylate derivatized with 4-armed pentaerythritol thiol; polyethylene glycol derivatized with 4-armed tetra-succinimidyl ester; polyethylene glycol derivatized with tetra-thiol; polyethylene glycol-co-poly(α -hydroxy acid) diacrylate macromer; 4-armed polyethylene glycol derivatized with succinimidyl ester and thiol cross-linked with methylated collagen, derivatized polyethylene glycol cross-linked with alkylated collagen, derivatized polyethylene glycol with tetra-hydrosuccinimidyl; and derivatized polyethylene glycol with tetra-thiol; and a combination thereof.

34. (New) The method of claim 33 wherein said sealant is derivatized polyethylene glycol cross-linked with alkylated collagen wherein the alkylated collagen is methylated collagen.

35. (New) The method of claim 34 wherein the support matrix is prepared from a material selected from the group consisting of Type I collagen; Type II collagen; Type IV collagen; cell-contracted collagen containing material selected from the group consisting of proteoglycan, glycosaminoglycan and glycoprotein; gelatin; agarose; hyaluronin; fibronectin; laminin; bioactive peptide growth factor; cytokine; elastin; fibrin; polymeric fiber made of a polylactic acid; polymeric fiber made of a polyglycolic acid; polycaprolactone; polyamino acid; a polypeptide, and collagenous gel; a copolymer thereof and a combination thereof.

36. (New) The method of claim 35 wherein said support matrix is the Type I or Type II collagen sponge, honeycomb, scaffold or honeycomb-like lattice, sol-gel or thermoreversible gelation hydrogel.

37. (New) The method of claim 36 wherein said hydrostatic pressure is the cyclic hydrostatic pressure from about 0.5 MPa to

about 5 MPa applied at frequency from about 0.5 Hz.

38. (New) The method of claims 35 wherein said cyclic hydrostatic pressure is about 3.0 MPa applied at frequency of about 0.5 Hz and is applied for from about seven days to about 14 days and wherein said resting period is from about seven to about 28 days.

39. (New) The method of claim 38 wherein said construct comprising said support matrix seeded with chondrocytes is submitted to the cyclic hydrostatic pressure and subjected to a flow of culture media at a flow rate from about 1 μ L/min to about 500 μ L/min.

40. The method of claim 39 wherein said flow rate is about 5 μ L/min to about 50 μ L/min and is performed in the presence of about 2% to about 20% oxygen.

41. (New) The method of claim 40 wherein a combination of said construct deposited into said lesion and said derivatized polyethylene glycol cross-linked with methylated collagen top sealant deposited over said construct results in an outgrowth of a layer of squamous-like flattened superficial zone chondrocytes (superficial cartilage layer) covering the layer of the second sealant and overgrowing the cartilage lesion.

42. (New) The method of claim 36 wherein said support matrix is thermoreversible gelation hydrogel and wherein said chondrocytes are suspended in said thermoreversible gelation hydrogel at a temperature below about 30°C when the thermoreversible gelation hydrogel is in a liquid sol form, and wherein said thermoreversible gelation hydrogel is subsequently converted into a solid gel form by treating it with a temperature between above 30°C and about 37°C.